

Description

Audio Content Distribution System

BACKGROUND OF INVENTION

[0001] FIELD OF INVENTION

[0002] This invention relates to a system for distributing audio content selected contemporaneously by radio listeners as they hear the content broadcast.

[0003] BACKGROUND OF INVENTION

[0004] Radio technology has proliferated for more than a century. In December 1894, Guglielmo Marconi invented his spark transmitter with antenna at his home in Bologna, Italy. He took his "Black Box" to Britain in February 1896 and filed for British Patent Number 12,039 on June 2, 1896. He formed his first Wireless Telegraph and Signal Company in Britain in 1897 at age 23 and the world's first radio factory the following year. The American Marconi Company was formed in 1899. Marconi controlled patents for the Lodge tuner of 1900, and Fleming valve of 1904 that acted as a diode tube to amplify electrical current in one

direction.

[0005] Through the following decades, radio experienced its "Golden Years" only to be eclipsed, but not replaced, by television. As the Internet evolved, it became clear it was a superior vehicle for delivering audio content to end users. To the dismay of copyright holders, peer-to-peer networks proliferated, enabling users to exchange high quality music outside the traditional distribution mediums. Industry groups representing the interests of the content creators have been forced to engage in heavy-handed tactics such as suing individual users that illegally exchanged copyrighted content online.

[0006] Even while the peer-to-peer networks were exchanging millions of songs daily, radio broadcasts continued to be an important medium for listeners and new technologies continued to evolve. Sirius Satellite Radio and XM Satellite Radio represent the radio industry's first major technological change since the popularization of FM radio in the 1970s: the creation of a third broadcast medium, transmitted by satellite, now taking its place alongside AM and FM on the radio dial. Satellite radio broadcasters transmit well over 100 discrete, radio channels to subscribers in digital sound.

[0007] A long-felt, but heretofore unfulfilled need exists in the radio and music industries for a technology that satisfies the way consumers enjoy music. Music listening may be divided into two main categories: (1) acquisition of new favorites; and (2) enjoyment of existing favorites. Radio broadcasting excels in the former category while peer-to-peer networks excel in the latter. Consumers listen to radio broadcasts to gain exposure to new music titles, particularly under the genre of the station. Once a consumer hears a music title they enjoy, they want to acquire it. Prior to music piracy on the Internet, the consumer would go to a music store and purchase the title. Even more recently, a user may now legally download a selection of titles available from authorized online distributors such as the "iTunes Music Store" offered by Apple Computer, Inc. However, a consumer listening to a traditional radio broadcast may not always obtain the necessary information to identify the music title. Furthermore, the consumer must engage in a substantial effort to obtain the music title by visiting a music store, logging into an online system to legally purchase the content or even engaging in illegal file sharing to download the content.

[0008] What is needed in the art is a system that enables con-

sumers to contemporaneously purchase music heard over radio broadcasts and have the content delivered to them automatically.

[0009] U.S. Patent No. 6,563,805 to *Ma et al.* describes a device for prepaid recording of digital audio signals. The patent describes a method wherein encrypted music is sent to a receiver which prevents recording of the audio content (col. 2, lines 16–24). The receiver holds a "Smartcard" which keeps track of the user's account balance (co. 2, lines 24–26). If the balance in the account is sufficient the encrypted data is decrypted by the receiver and can then be recorded by the user (col. 2, lines 26–31).

[0010] International Publication No. WO 00/31906 and related European Patent Application No. 99119395.4 to *Sony Electronic, Inc.*, hereinafter the '906 application, describe a method and system for interactive digital radio broadcasting and a method and device for transmitting, receiving, and transferring said digital information, respectively. The '906 application describes a method and system wherein contextual information is broadcast along with the audio content (col. 4, lines 6–11). The contextual and audio content are then parsed and made available to the user (col. 4, lines 12–18). Additionally, a memory card is used

to store the contextual information for later retrieval to facilitate ordering or recording of the audio content (col. 4, lines 32–35). This method requires the coupling of the audio content and additional information in the data stream.

- [0011] U.S. Patent No. 6,564,003 to *Marko et al.* describes a method and apparatus for creating a composite data stream containing multiple channels of content. The '003 method as described allows a user to record the entire data stream and select the desired content through an apparatus which de-multiplexes the data by accessing the header information which identifies where in the composite stream the desired content resides (col. 3, lines 1–5).
- [0012] U.S. Patent No. 6,347,216 to *Marko et al.* describes a method for providing geographic specific services via a satellite communication network. The system uses a terrestrial transponder which sends a signal containing identification information (col. 2, lines 25–30). The satellite then recognizes the signal and transmits predetermined geographic-specific content to the corresponding receiver (col. 2, lines 35–49).
- [0013] The above-mentioned references neither disclose individual not in combination suggest the present invention

summarized as follows.

SUMMARY OF INVENTION

[0014] The present invention is a method and apparatus for efficiently and directly distributing audio content to subscribers that hear the audio content over the radio. In an embodiment of the invention, a user identification value is assigned to a subscriber. Contact information on the subscriber is linked to the user identification value. A channel identification value is assigned to a radio station. An audio content value is assigned to an audio recording played over a radio transmission. A play database is generated, the database storing the time at which each audio recording was played on each radio station. A signal is received having a user identification value and a channel identification value. The play database is cross-referenced for the audio content value of the audio recording played on the radio station at the time the signal was received.

[0015] Data associated with the audio content value is transmitted to the subscriber according to the stored contact information. The data may be a digital audio file processed to include digital rights management (herein "DRM") prior to transmission to the subscriber. The user identification value may also be encoded in the digital audio file prior to

transmission to the subscriber. Upon transmission of the digital audio file a billing transaction is executed wherein the subscriber may be charged or debited for the transmission through billing information stored with the subscriber contact information. As an alternative to transmitting the digital audio file directly, a link to purchase the audio recording may be transmitted to the subscriber.

[0016] In another embodiment of the invention, the data associated with the audio content value is recorded onto an optical disc such as a digital versatile disc (herein "DVD") or a compact disc (herein "CD") and delivered to the subscriber. In yet another embodiment, the data associated with the audio content value is information relating to the performance of the audio recording played over the radio transmission.

[0017] The play database may be generated prior to the broadcast of the associated audio recordings and the transmission of data associated with the audio content value is substantially performed in real time. Alternatively, the play database is generated subsequent to the broadcast of the associated audio recordings, the received signals are stored in a queue and the transmission of data associated with the audio content value is performed responsive to

an update of the play database to match the time, channel identification value and audio content value received in the signal.

[0018] An advantage of the present invention is that the radio transmission may originate from traditional, terrestrial-based antennas or from earth-orbiting satellite. No special equipment or modification of the existing radio transmissions is required.

[0019] Embodied as an apparatus, the present invention includes a transmitter communicatively coupled to a radio receiver device. A computer readable store holds a user identification value, the store communicatively coupled to the transmitter. A radio channel coupler is communicatively coupled to the transmitter, the coupler adapted to identify a radio station currently played by the radio broadcast device. An audio selection means is communicatively coupled to the transmitter whereby upon execution of the audio selection means, the transmitter generates a signal including the user identification value and the identity of the radio station currently playing on the radio broadcast device. The signal generated by the transmitter may be transmitted over numerous mediums and formats such as TCP/IP for networked communications, IEEE 802.15

(BlueTooth), IEEE 802.11 (WiFi), analog or digital cellular transmissions or dual-tone-multi-frequency (DTMF) signals over a traditional telephone connection. Other transmission protocols and mediums may be employed as understood by those of ordinary skill in the art.

[0020] A receiver may be communicatively coupled to the transmitter, the receiver adapted to receive the signal generated by the transmitter. A subscriber contact information store is communicatively coupled to the receiver and a play database is also communicatively coupled to the receiver. The play database includes at least one table associating an audio recording to the radio station and time at which it was broadcast. A timer is communicatively coupled to the receiver whereby upon reception of the signal by the receiver, the play database is cross-referenced for the audio content played according to a time value, the time value generated by the timer contemporaneous with the reception of the signal.

[0021] An audio content delivery means coupled to the receiver may include a computer software process whereby information relating to the audio content identified in the play database is transmitted to the subscriber. The information may be a digital audio file of the audio content. The digi-

tal audio file may be encoded with the user identification value prior to transmission to the subscriber. The digital audio file may also be encoded with digital rights management prior to transmission. The information transmitted to the subscriber may also include a link to purchase the audio content or other data relating to the actual performance of the audio recording by the recording artist.

[0022] In an alternative embodiment of the invention, a computer readable store holding a user identification value is communicatively coupled to a transmitter. A radio channel selection means communicatively coupled to the transmitter is provided to select a radio station, the selected radio station updated by a wireless reception means adapted to populate the computer readable store with radio station information. An audio selection means is communicatively coupled to the transmitter whereby upon execution of the audio selection means the transmitter generates a signal comprising the user identification value and the identity of the radio station currently playing on a radio broadcast device. A timer is communicatively coupled to the audio selection means whereby the signal generated by the transmitter includes a time-stamp value representative of the time when the audio selection means was activated.

BRIEF DESCRIPTION OF DRAWINGS

- [0023] For a fuller understanding of the nature and objects of the invention, reference should be made to the following detailed description, taken in connection with the accompanying drawings, in which:
- [0024] FIG. 1 is a diagrammatic view of an embodiment of the invention.
- [0025] FIG. 2 is a diagrammatic view of an embodiment of the invention wherein modifications are made prior to transmission of a digital audio field to a subscriber.
- [0026] FIG. 3 is a diagrammatic view of an embodiment of the invention wherein multiple signals are received and an array of audio content titles are stored on an optical disc and delivered to the subscriber.
- [0027] FIG. 4 is a diagrammatic view of an embodiment of the invention wherein a link to purchase the audio content selected is transmitted to the subscriber.
- [0028] FIG. 5 is a diagrammatic view of an embodiment of the invention showing asynchronous selection and delivery of audio content to the subscriber wherein a play database is updated after broadcast of the associated audio content while signals are queued until the play database is available for the subscriber selection.

[0029] FIG. 6 is a diagrammatic view of an embodiment of the invention showing a portable radio coupled to an audio content selection means.

[0030] FIG. 7 is a diagrammatic view of an embodiment of the invention wherein a portable audio selection device is not communicatively coupled to the radio broadcast device.

[0031] FIG. 8 is a diagrammatic view of an embodiment of the invention showing an audio content selection means integrated into the radio broadcast device.

[0032] FIG. 9 is a portable handheld wireless device having software enabling the present invention.

[0033] FIG. 10 is a diagrammatic view showing the portable handheld wireless device operating according to an embodiment of the invention.

[0034] FIG. 11 is a diagrammatic view of an embodiment of the invention showing a portable handheld wireless device wirelessly coupled to a portable radio broadcast device.

DETAILED DESCRIPTION

[0035] Turning to Fig. 1, numeral 10 denotes the method according to an embodiment of the invention as a whole. A user identification value 20 is assigned to a subscriber 30. The user identification value 20 is preferably a primary database key incrementally assigned as known to those

skilled in the art of database design. Contact information 35 on the subscriber is linked to the user identification value 20. The contact information 35 may include, but is not limited to, name, address, telephone, email, demographic information, listening preferences, billing information and network connection configuration settings. A channel identification value 40 is assigned to a radio station channel 50. An audio content value 60 is assigned to an audio recording 65 played over a radio transmission. A play database 70 is generated, the database 70 storing the time at which each audio recording was played on each radio station channel. A signal 80 is received having the user identification value 20 and the channel identification value 40. The play database 70 is cross-referenced for the audio content value 60 of the audio recording played on the radio station channel 50 at the time the signal 80 was received.

[0036] Data 90 associated with the audio content value 60 is transmitted to the subscriber 30 according to the stored contact information 35. As shown in Fig. 2, the data 90 may be a digital audio file processed to include digital rights management (herein "DRM") 95 prior to transmission to the subscriber. DRM is a type of server software

developed to enable secure distribution and to disable illegal distribution of paid content between computing devices. DRM software is widely available and includes commercially available products such as CONTENTGUARD (by ContentGuard, Inc.), INTERTRUST DRM (by InterTrust and Magex), EMEDIATER DRM (by MediaDNA, Inc.), and SAFE-CAST (by Macrovision Corporation).

[0037] The format of the digital audio file may include any known format, the most popular currently being MPEG-1 Audio Layer-3 (MP3). MP3 is a standard technology and format for compression a sound sequence into a very small file (about one-twelfth the size of the original file) while preserving the original level of sound quality when it is played. Digital audio is typically created by taking 16 binary digit samples a second of the analog signal. Since this signal is typically spread out over a spectrum of 44.1 thousand cycles per second (kHz), one second of CD quality sound requires 1,400,000 bits of data. Based on how people actually perceive sound, the developers of MP3 devised a compression algorithm that reduces data at sound frequencies that most listeners can not perceive. MP3 is currently the most powerful algorithm in a series of audio encoding standards developed under the sponsorship of

the Motion Picture Experts Group (MPEG) and formalized by the International Organization for Standardization (ISO).

[0038] The user identification value 20 may also be encoded in the digital audio file prior to transmission to the subscriber 30. By encoding the user identification value 20 within the digital audio file, its use and distribution may be tracked to a single point of origin. An advantage to this method is that the file is tagged with the identity of the subscriber 30 who is less likely to illegal share the file since it is traceable to the subscriber 30. Upon transmission of the digital audio file (data 90) a billing transaction 100 is executed wherein the subscriber 30 may be charged or debited for the transmission through billing information stored with the subscriber contact information 35.

[0039] In another embodiment of the invention shown in Fig. 3, the data 90 associated with the audio content value 60 is recorded onto an optical disc 110 such as a digital versatile disc (herein "DVD") or a compact disc (herein "CD") and delivered to the subscriber 30. An advantage of this embodiment is that multiple selections in the form of a plurality of signals 80a-d are queued up until the capacity

of the optical disc is reached. Thereafter, the disc is delivered to the subscriber 30. This embodiment is particularly useful for certain high quality formats such as DVD-Audio (DVD-A). DVD-A is a DVD format, developed by Panasonic, that is specifically designed to hold audio data, and particularly, high-quality music. The DVD Forum, consisting of 230 leading companies worldwide, released the final DVD-A specification in March of 1999. The new DVD format is said to provide at least twice the sound quality of audio CD on disks that can contain up to seven times as much information. Philips and Sony offer a competing technology known as Super Audio CD (SACD) which provides similar audio quality.

[0040] In yet another embodiment, the data associated with the audio content value is information relating to the performance of the audio recording played over the radio transmission. Figure 4 shows an alternative to transmitting the digital audio file or optical disc directly. Rather, a link 120 to purchase 130 the audio recording may be transmitted to the subscriber 30.

[0041] The play database may be generated prior to the broadcast of the associated audio recordings and the transmission of data 90 associated with the audio content value is

substantially performed in real time. However, a number of regulations forbid the publication of a radio station's play list prior to broadcast of the audio content. Presumably, this lessens the likelihood listeners could plan ahead to record the audio content they desire thereby circumventing the traditional music distribution system. Accordingly, the play database can be generated subsequent to the broadcast of the associated audio recordings as shown in Fig. 5. The received signals 80 are stored in a queue 140 and the transmission of data 90 associated with the audio content value 60 is performed responsive to an update 150 of the play database 70 to match 160 the time, channel identification value and audio content value held in the queue 140.

[0042] An advantage of the present invention is that the radio transmission may originate from traditional, terrestrial-based antennas known to broadcast FM and AM signals, or from earth-orbiting satellites as deployed by XM Radio and Sirius. Another advantage of the present invention is that no special equipment or modification of the radio transmissions is required.

[0043] Fig. 6 shows the present invention embodied as an apparatus 170 including a transmitter 180 communicatively

coupled to a radio receiver device 200. A computer readable store 210 holds the user identification value 20, the store 210 communicatively coupled to the transmitter 180. A radio channel coupler 190 is communicatively coupled to the transmitter 180, the coupler 190 adapted to identify a radio station currently played by the radio broadcast device 200. An audio selection means 220 is communicatively coupled to the transmitter 180 whereby upon execution of the audio selection means 220, the transmitter 180 generates the signal 80 including the user identification value 20 and the identity of the radio station currently playing on the radio broadcast device 200. The signal generated by the transmitter may be transmitted over numerous mediums and formats such as TCP/IP for networked communications, IEEE 802.15 (BlueTooth), IEEE 802.11 (WiFi), analog or digital cellular transmissions or dual-tone-multi-frequency (DTMF) signals over a traditional telephone connection. Other transmission protocols and mediums may be employed as understood by those of ordinary skill in the art.

[0044] A receiver 230 may be communicatively coupled to the transmitter 180, the receiver 230 adapted to receive the signal generated by the transmitter 180. A subscriber

contact information store 35 is communicatively coupled to the receiver 230 and a play database 70 is also communicatively coupled to the receiver 230. The play database 70 includes at least one table 240 associating an audio recording to the radio station and time at which it was broadcast. A timer 250 is communicatively coupled to the receiver whereby upon reception of the signal 80 by the receiver 230, the play database 70 is cross-referenced for the audio content played according to a time value, the time value generated by the timer 250 contemporaneous with the reception of the signal 80.

[0045] Fig. 7 illustrates an alternative embodiment of the invention wherein a portable communication device 260 is manually actuated to request the audio content. The portable communication device 260 may be a cellular phone or a wireless email communicator such as a BLACKBERRY device sold by Research in Motion, Inc.

[0046] In the previous examples, it is assumed that the transmission and reception of the signal 80 is synchronous with the broadcast of the audio and the contemporaneous selection by the subscriber. However, mobile networks and other communication mediums may experience intermittent outages. Accordingly, Fig. 8 shows an embodiment of

the invention capable of asynchronous communication wherein a timestamp value 270 is transmitted in addition to the channel identification value 40 and the user identification value 20. If the signal 80 is delayed, the timestamp value 270 permits the play database 70 to use the timestamp value to accurately cross-reference the audio content value 60 and channel identification value 40 with the exact time at which it was broadcast.

[0047] A computer readable store holding the user identification value is communicatively coupled to a transmitter. A radio channel selection means 280 (Fig. 9) communicatively coupled to the transmitter is provided to select a radio station, the selected radio station updated by a wireless reception means adapted to populate the computer readable store with radio station information. An audio selection means 290 is communicatively coupled to the transmitter whereby upon execution of the audio selection means the transmitter generates a signal comprising the user identification value and the identity of the radio station currently playing on a radio broadcast device. A timer is communicatively coupled to the audio selection means whereby the signal generated by the transmitter includes a time-stamp value representative of the time when the

audio selection means was activated. The BLACKBERRY device is shown in Fig. 9 as an example of wirelessly populating a computer readable store with radio station information. User Channels 01–05 indicate not only the type of genre, but also the broadcast medium. Subscribers are automatically updated with the national (satellite) and local (FM and AM) radio stations in a preselected area. As shown in Fig. 10, the subscriber need only indicate which station he or she is listening to prior to executing a request for the audio content on the wireless device 260.

[0048] In Fig. 11, a portable communication device 260 (embodied as a NOKIA cellular phone) is wirelessly coupled 300 to the radio receiver device 200. The wireless coupling 300 protocol can be any known to those skilled in the art, such as WiFi or BlueTooth. An advantage of this wireless coupling is that separate circuitry and service billing is not required for a portable communication device 260 capable of sending data transmissions. Thus, additional infrastructure and expense is minimized.

[0049] It will be seen that the objects set forth above, and those made apparent from the foregoing description, are efficiently attained and since certain changes may be made in the above construction without departing from the scope

of the invention, it is intended that all matters contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

[0050] It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween. Now that the invention has been described,